

NOAA Small Boat Safety Board Risk Analysis of AFSC/NMML Ice Seal Operations

The NOAA Small Boat Safety Board (SBSB) met via phone conference on March 29th to discuss AFSC/NMML's request for NOAA to support the usage of their typical Mustang suit, MS-185 or the MS2195, as an alternative to the required United States Coast Guard's MSD900s dry suit.

SBSB Members in Attendance:

LT G. Mark Miller, NOAA, SBSPC, (Chair)
Dennis Donahue, GLERL
Wayne Hoggard, SEFSC
Dennis Thaute, OLE-AK
Dana Wilkes, NMSP
CAPT John Humphrey, NOAA, OMAO

Others:

Paul Parsons, NMAO SEC Division
Michael Cameron, AFSC/NMML (NMML Seal Capture Team Leader)

Overview

The SBSB has a significant amount of experience operating in cold waters and areas of ice, but has no direct experience with seal captures. The SBSB had Michael Cameron, NMML join in during the meeting to explain and support the NMML request. It was evident that the NMML group has many years of experience in this operation with an exemplary safety record. The CO of HEALY had stated he would accept the NMML suits if it was official NOAA policy.

Survivability:

It is undisputed by all participants that the dry suit option is by far the safest in the event of an accidental water entry.

In 32° F water:

MS2195/MS185 - estimated 10 minutes before cardiac arrest. From Dennis Donahue's personal experience while training with the USCG in the Great Lakes, mental and physical incapacitation begins within 2 minutes at 40°F.

MSD900 - estimated 6 hours survival time. Experience shows no dramatic effects on consciousness or ability to perform tasks within 15+ minutes.

Other dry suit options – survival time varies with choice of undergarments, but is dramatically increased over the standard Mustang suit.

Rescue Response:

The SBSB believes it is not only possible, but likely that in the event of an accidental water entry:

1) it would be unlikely that one person could assist an individual in a water soaked MS2195 or MS185 and clothes into the boat if the person was incapacitated in any way. Of course this depends on the individuals.

2) Response time from other team boats may not be as rapid as estimated due to the need to navigate ice floes. At the extreme, the boats operate approximately one half mile apart. [.5nm @ 20 knots = 1.5 minutes] without the ice to navigate. Although it is unlikely an incident would happen while the boats

are separated by this distance it is very conceivable to take 2 minutes to achieve 40 yards in a chosen direction.

3) The victim should be considered dead weight in less than 2 minutes in the water at which point it would be difficult for even two people to recover the victim. Once again, dependant on the individuals.

Completion of task (mobility):

The matter of reduced personal mobility (maneuverability) for seal capture was considered the most significant factor in requesting the use of the regularly used MS2195 and MS-185 anti-exposure worksuit. The SBSB does not feel advances in technology were investigated as options to address the clear improved safety of the dry suit and maneuverability of the lightweight suits available on the market today. Example: The MSD585 is a more comfortable version of the (MSD575) suit used by Navy SEAL teams during operations. \$714 GSA.

Outcome:

NOAA's PFD policy does not specifically addresses small boat operations in areas of ice and waters near 0°C. After discussion and research the SBSB has concluded there is not enough justification to contradict the USCGC HEALY policy of wearing MSD900 Mustang Immersion Work Suits or other dry suits by boat crews.

The SBSB unanimously recommends the NMML group to follow USCG policy and investigate and test new technologies in ways to assure survivability in the event of accidental water entry without affecting personal mobility (maneuverability).

None of these risk analysis results and requirements shall limit the authority and judgment of the Commanding Officer in his exercise of command and supervision of this NOAA Project operating from USCGC HEALY.

Attached:

NOAA-NMML Small Boat Operations for Ice Seal Studies

NOAA-NMML Small Boat Operations for Ice Seal Studies

This document will describe the equipment, methods, and protocols used by NMML personnel when using small boats to capture seals hauled out on floating pack ice.

Background

The goal of the Bering Ecosystem Study (BEST) Program is to develop an end-to-end mechanistic understanding of how climate change will affect the marine ecosystems of the eastern Bering Sea, the continued use of their resources, and the social, economic and cultural sustainability of the people who depend on them. Though not officially part of the BEST program, researchers from NOAA's National Marine Mammal Laboratory (NMML), have been asked to participate in the BEST research cruise aboard the *USCGC Healy* from March 9 to May 12, 2007, and on a similar cruise also aboard the *Healy* from May 16 to June 19, 2007, to study the diet, foraging behavior, seasonal movements, and habitat use of seals in the Bering Sea.

Bearded, spotted, ringed, and ribbon seals, often referred to collectively as "ice seals", are seasonally ice-associated species that are vulnerable to climate change through loss of sea ice. The ice seals found in the Bering Sea during spring have rarely been studied, and there are no current estimates of abundance or comprehensive descriptions of their distribution and habitat use. Further, they are also critical to the nutritional and cultural sustainability of Alaska Native communities along the Bering Sea coast. Local concentrations of these animals on the ice are some of the most conspicuous indicators of prey concentrations and associated biological and physical processes in the underlying water and benthos. A fundamental understanding of these seals' abundance, distribution, and foraging ecology is therefore essential for an understanding of mechanistic links between lower trophic and human components of the Bering ecosystem.

Equipment and safety supplies

Three inflatable boats are used in each capture attempt. Usually, this will include two Zodiac Mark II Grand Raids, and one Mark III Grand Raid. These are professional/military-grade inflatable boats designed specifically for use in remote and hazardous sea conditions. They are time tested and renowned for their stability, safety and speed, and have lifting bridles for rapid launch and recovery by crane from the *Healy*. NMML researchers have successfully used these types of boats for seal capture operations in both Arctic and Antarctic pack-ice for over 20 years with an excellent safety record. Each boat will be equipped with a Honda 25 hp 4-stroke outboard motor. The outboards have recently been tested, serviced and then re-tested to ensure reliable performance. These engines are proven to be one of the most dependable and safe outboards in the industry. They are simple to operate and maintain in the field.

Each boat launched from the *Healy* for marine mammal studies will be equipped with:

- 1) 1 or more handheld VHF radios with fully-charged batteries,
- 2) 1 handheld GPS with fresh batteries, and a compass,
- 3) 1 EPIRB,
- 4) Anchor and spare line,

- 5) A repair kit including an inflatable boat patch kit, inflation valves, foot pump, bilge pump, a basic tool kit and spare parts (e.g., spark plugs, fuel line, etc.),
- 6) A safety kit containing a field first aid kit, food, water, flares, signal mirror, radar reflector, air horn, whistle, rescue throwing line, fire extinguisher, knife, flashlight, etc
- 7) Copies of all permits required to be in possession during seal research.

The NMML will provide the operators for the inflatables. Each boat will carry two people (on occasion the Mark III may have an additional person). All members of the NMML research team will have received NOAA approved, certified training in small boat operations and safety, as well as in CPR and First Aid. Three of the six team members are experts in each of three areas: 1) seal handling, 2) small boat operation and 3) working on and around sea ice. The remaining three team members are apprentices, who are experts in at least one of these areas and experienced in most others.

As in all of our previous work over the last 20 years, all personnel embarking small boats for seal studies will have full Mustang-style float suits (we prefer the “standard” “MS-185 or the MS2195, over the heavier and bulkier MSD900s dry suit), bunny boots (or other appropriate footwear), waterproof gloves, sunglasses, and warm headwear at all times. Throughout our experience in Polar Regions, we have found that the “standard” Mustang suits offer an excellent combination of cold water protection and flotation, without sacrificing the maneuverability and speed required to capture a seal before it escapes off of an ice floe and into the water. In our opinion, the dry suit characteristics of the MSD900 would significantly impair our ability to capture a seal and introduce the danger of overheating after running to capture and restrain a seal. Opening the zipper on the MSD900 suit to “dump” this heat will negate its use as a dry suit.

Seal capture and handling operations

Whenever a seal is seen hauled out onto the ice during daylight hours NMML researchers will, in consultation with the Chief Scientist, decide whether to request that the *Healy* be stopped to launch the Zodiacs for seal capture operations. Many factors are considered in this decision including the weather and the ice conditions. Attempting a capture event in rough seas and high winds (e.g. greater than Beaufort scale 3 or 4) is futile as seals are much less likely to stay on the ice when approached by boat. Similarly, the ice floe with the seal must be judged to be reasonably strong enough to support the seal, four people and their equipment.

If the decision is made to attempt to capture the seal, the *Healy* will move to within 1.5 miles of the seal and come to a full stop. *Healy's* deck crew and crane operators will lower our three Zodiacs into the water. Using a ladder hung over the side of *Healy*, members of the capture party will climb down into the boats (at least two people for each boat). After the operators of each vessel has established radio communications with: 1) the bridge, 2) the spotter stationed on the bridge, and 3) the other Zodiacs, the capture team will motor towards the target seal's ice floe (if necessary directed by a spotter on the bridge). The three boats will then split up and take positions to surround the floe at a distance of about 1/3 mile. Coordinated via radio, they will then close in on the target seal. Often the seal becomes confused by the approaching boats and hesitates while deciding if it should escape into the water or stay on the ice floe. As the researchers approach the ice floe, they will make a final determination about the safety/stability of the ice, and, if the ice is determined to be safe, researchers on each of the three boats will jump onto the floe with hoop nets to capture the seal. Once the seal is captured and restrained the necessary handling equipment will be unloaded from the Zodiacs onto the ice and four researchers will proceed to measure, weigh, take biological samples from the seal and

instrument it with a satellite-linked location transmitter. The two Mark II Zodiacs will be tied/anchored close to the floe with their outboards shut off. The operator of the Mark III and one additional person will remain in the larger Zodiac with the outboard running to render immediate assistance if it becomes necessary and to serve as spotters for unsafe changes in the weather, ice conditions and the presence of polar bears. After releasing the seal, the NMML researchers will climb back into their original boats, start their outboards, and cast off from the floe.

The entire operation takes less than 1 hour so, with the permission of the bridge, NMML researchers may choose to remain in the pack ice, with 2 miles of the ship, to continue to hunt for additional seals to capture. This often includes frequent radio calls to the spotter positioned on the bridge. If the bridge determines that conditions are unsafe, or for any other reason requires that researchers return to *Healy*, the field party will immediately return together to the ship. After climbing back up the ladder on the side of the ship, the *Healy's* crew and crane operators will raise the three inflatable boats back onto the deck. Once all equipment and team members are aboard, the team leader will notify the bridge that the pinniped capture and handling operations are complete and that the ship can again get underway.

Precautions for dealing with polar bears

Polar bears are rare in the Bering Sea ice types in which seal capture operations will take place. Nevertheless, the potential for an encounter with a polar bears exists for personnel that spend time on or within the pack ice. Naturally, all personnel working in the sea ice should remain vigilant with respect to polar bears, as well as to weather conditions and other hazards. To further reduce the danger to personnel working off of the ship, the following guidelines will be followed: 1) Personnel will not be allowed off of the ship when a bear has been sighted in the area. 2) Whenever personnel are away from the ship a dedicated spotter will be positioned on the bridge to serve as a lookout for polar bears. 3) In areas of highly ridged or jumbled ice, personnel will be particularly vigilant about their surroundings. 4) Continuous monitoring of VHF radio by ice party must be maintained. In the unlikely event that a polar bear is spotted, either by an observer on *Healy* or by members of the field party, all field operations will cease and all personnel will return to the ship until the polar bear is deemed to no longer be a threat. In the extremely rare case of a polar bear surprising a field party, such that they can not escape the encounter in time, the field party should make noise and to attempt to stall the bear or scare it away while boarding the zodiacs and maneuvering to open water.

Important points in the decision to allow NMML researchers to use the “standard” Mustang suit

- NMML researchers have a lot of experience successfully conducting the proposed type of work in polar environments with this equipment, and an excellent safety record.
- NMML researchers must be quick and agile to capture a seal before it escapes off of an ice floe and into the water. The MDS900 is heavier and bulkier than the standard Mustang suits and heat dumping will likely be a dangerous problem
- The *Healy* is always close by and in constant radio contact
- The proposed operations will always be done during full daylight hours and never in bad weather or on unsafe ice
- Other than the short time period when the boats are separated to surround the seal, all three Zodiacs will always be very close together and able to render immediate assistance if it becomes necessary.